Mission Restoration Project

Air QualityReport

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for:
Methow Valley Ranger District
Okanogan-Wenatchee National Forest

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Contents

Figures

Regulatory Framework

Land and Resource Management Plan

The OkanoganNational Forest Land and Resource Management Plan (ONFLRMP; USDA 1989) provides standards and guidelines for air quality in this project area.

Forest-wide Standards and Guidelines:

MA 14-1: Management activities within the Forest shall be planned to maintain air quality at a level adequate for the protection and use of the National Forest resources, and which also meet or exceed the applicable Federal and State standards.

MA 14-2: The Forest shall demonstrate reasonable progress in reducing total suspended particulate (TSP) emissions from prescribed burning.

Forest Service Manual Direction

Forest Service Manual 2580.3 – Air Resource Management Policy

1. Integrate air resource management objectives into all resource planning and management activities.

2. Use cost-effective methods of achieving resource management objectives.

FederalLaw

Clean Air Act (CAA)

The Clean Air Act (CAA)(42 U.S.C. 7401-7671q) createdprimary and secondary national air quality standards to protect public health and welfare. Through the CAA, the Environmental Protection Agency (EPA) set primary and secondary National Ambient Air Quality Standards (NAAQS)(40 CFR part 50) for specific criteria pollutants considered harmful to public health and the environment. Primary NAAQS set limits on criteria pollutants to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary NAAQS set limits on criteria pollutants to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings(USEPA 2016). The U.S. Forest Service must ensure that its activities, or activities it permits, comply with these national standards and any State and local requirements for air pollution control. The CAA also established Class I air quality areas (areas larger than 5,000 acres that weredesignated as wilderness as of August 7, 1977) where little air quality deterioration is allowed over baseline levels. The U.S. Forest Service must protect air quality-related values in Class I areas within National Forest boundaries.

State and Local Law

Washington State Smoke Implementation Plan

Prescribed burning activities conducted by the Forest Service, including those described in the proposed action, are classified as silvicultural burning. National Forests in Washington State are required to conduct prescribed burning under the current state Smoke Implementation Plan(SIP) (Washington DNR 1998), regulated by the Washington State Department of Natural Resources (DNR). DNR staff grant or deny smoke approval following the SIPto limit impacts to primary and secondary NAAQS. The current SIP also contains provisions to avoid impacting Class I airsheds with smoke from prescribed burning (Peterson et al. 1992).

Other Guidance or Recommendations

Watershed Analyses

Twisp River Watershed Analysis(USDA 1995) Recommendations:
This analysis covers the Buttermilk Creek portion of the Mission project area. Of the objectives listed in this analysis, Objective # 24 addresses reduction of impacts to air quality and recommends scheduling prescribed burning in such a way to reduce smoke impacts to adjacent landowners and forest visitors. Recommended monitoring includes monitoring visibility to determine how management activities negatively impact air quality, and continue monitoring air quality with the monitor located in Twisp, WA.

Lower Methow Watershed Analysis(USDA 1999) Recommendations:
This analysis covers the Libby Creek portion of the Mission project area. No recommendations were made in this analysis specific to air quality.

Affected Environment and Environmental Consequences

Resource Indicators and Measures

Prescribed fire treatments proposed in this project would produce two criteria pollutants regulated by NAAQS: fine-sized particulate matter (PM) particles up to 2.5 microns (PM2.5), and coarse-sized particulate matter up to 10 microns (PM10). (For comparison, a human hair is about 75 microns thick.) These pollutants are measured by micrograms per cubic meter of air ($\mu g/m^3$). Figure1 displays these pollutants and their current primary and secondary NAAQS (USEPA 2013).Figure 2 displays how PM2.5 and PM10 will be used as resource indicators in this analysis.

Figure 1. EPA NAAQS for Criteria Pollutants PM2.5 and PM10

Pollutant	Primary or Secondary	Averaging Time	Level	Form
Particulate Matter (PM2.5)	Primary	1 year	12.0 $\mu g/m^3$	Annual mean, averaged over 3 years.
	Secondary	1 year	15.0 $\mu g/m^3$	Annual mean, averaged over 3 years.
	Primary & Secondary	24 hours	35.0 $\mu g/m^3$	98th percentile, averaged over 3 years.
Particulate Matter (PM10)	Primary & Secondary	24 hours	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years.

Figure2: Resource Indicators and Measures for Assessing Effectsto Air Quality

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: P/N, or key issue?	Source (LRMP S/G; law or policy, BMPs, etc.)?
Air quality impacts	Particulate matter emissions	Particulate matter at 2.5 microns, measured as micrograms per cubic meter µg/m^3 (PM2.5)	Key issue: Prescribed burning will negatively affect air quality.	USEPA 2016
		Particulate matter at 10 microns, measured as micrograms per cubic meter µg/m^3 (PM210)		

Methodology and Impact Analysis Definitions

Resource Indicator: Particulate Matter at 2.5 microns and 10 microns

This analysis will consider the impacts of prescribed burning on airsheds within and near the project area that are most likely to be affected by PM, including nearby Class I airsheds (Figure 3). For the discussion of current air quality, past monitoring data from the air quality monitor closest to the project area (in Twisp, WA, four miles to the northeast of the project boundary) will be used to establish past impacts of sources of PM on air quality. Particulate matter (PM) that would be created by proposed prescribed burning will be determined by modeling expected emissions from proposed prescribed fire treatments with CONSUME 3.0 (Ottmar et al. 2005). Projected fuel loadingscreated by proposed thinning projects is from selected photo series (Maxwell and Ward, 1976; Ottmar et al. 1998). Modeling scenariosuse average environmental conditions and expected fuel loading present during four prescribed burning scenarios: underburning (including maintenance burning conducted approximately 10-15 years after the initial prescribed fire treatment), hand-pile burning, machine-pile burning, and landing-pile burning. A detailed description of modeling methods, data, and results are available in the project record.

Figure 3. Airsheds Within and Near Project Area

Airsheds In & Near Project Area	Type of Airshed	Direction from Analysis Area	Distance from Analysis Area
Methow Valley outside of towns	Populated Area	Within & adjacent	Within & adjacent
Carlton	Town	East	1 mile
Methow	Town	Southeast	7 miles
Pateros	Town	Southeast	13 miles
Twisp	Town	East	4 miles

Airsheds In & Near Project Area	Type of Airshed	Direction from Analysis Area	Distance from Analysis Area
Winthrop	Town	North	11 miles
North Cascades National Park	Class I	Northwest	16 miles
Glacier Peak Wilderness	Class I	West	7 miles
Pasayten Wilderness	Class I	North	24 miles
Lake Chelan-Sawtooth Wilderness	Class II	Within& adjacent	Within& adjacent

Impact Analysis Definitions for Air Quality

Type of Impact

- Adverse: Increases emissions or raises potential pollutant concentrations
- Beneficial: Reduces emissions or lowers potential pollutant concentrations

Duration of Impact

- Short-term:For prescribed fires, the length of time it takes for smoke to dissipate from a single prescribed burn in the project area(up tothree days); for wildfires, the length of time it takes for smoke to dissipate from uncontrolled burning in the project area during periods of inadequate ventilation (up to two weeks).
- Long-term: Time periods longer than three consecutive days (for prescribed burning) or two weeks (for wildfires).

Intensity of Impact

- None: No impacts
- Negligible: Particulate matterproduction occurs and smoke is visible, but does not affect sensitive groups or the general public as defined by Washington Department of Ecology (WA DOE 2013b) or the general public; or reduction in wildfire burned area as a result of previous treatments is less than 50 acres.
- Minor: Particulate matter production may cause air quality to be moderate (ibid);or reduction in wildfire burned area as a result of previous treatments is less than 51-250 acres.
- Moderate: Particulate matter production may cause air quality to be unhealthy for sensitive groups; or reduction in wildfire burned area as a result of previous treatments is 251-1000 acres.
- Major: Particulate matter production may cause air quality to be unhealthy to very unhealthy for sensitive groups (ibid) and the general public;or reduction in wildfire burned area as a result of previous treatments is greater than 1000 acres.

Affected Environment

This analysis addresses the issue of potential air quality impacts from actions proposed by this project. Air quality impacts are generally short-lived, and at the time of this analysis, the Twisp monitor did not show any PM2.5 and PM10 concentrations (August 2016). Levels of these criteria pollutants do not currently violate primary or secondary NAAQS. Given the transitory nature of air quality impacts and the current lack of particulate matter, theaffected air quality environment will be described further using anecdotal evidence and past monitoring. Figure 4 displays the current levels of PM2.5 and PM10 for the existing condition.

Figure4: Resource Indicators and Measures for the Existing Condition

Resource Element	Resource Indicator	Measure	Existing Condition (Alternative 1)
Air quality impacts	Particulate Matter emissions	Tons of Particulate matter at 2.5 microns (PM2.5)	0
		Tons of Particulate matter at 10 microns (PM10)	0

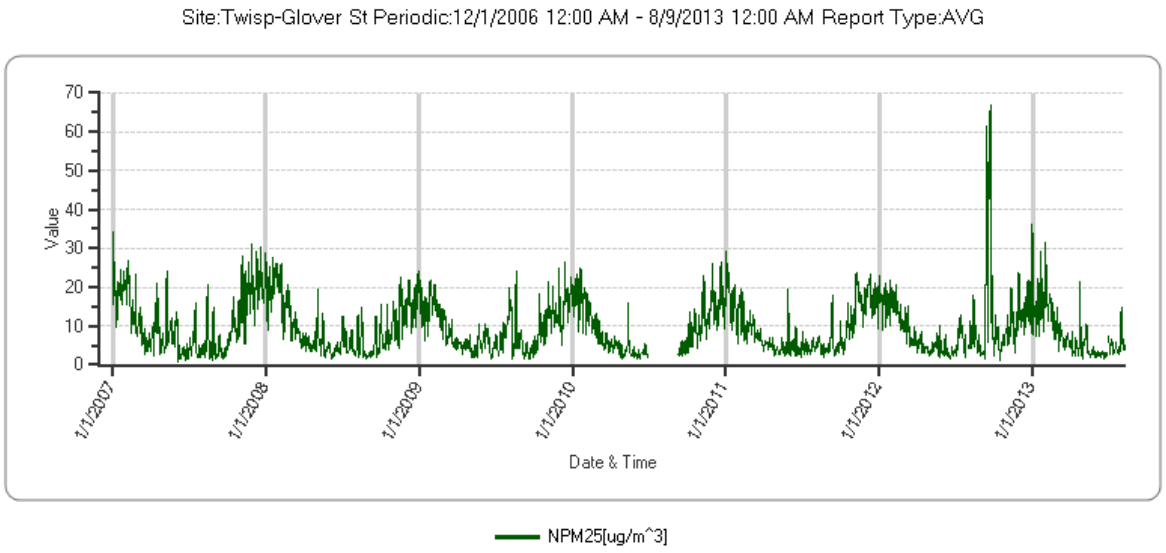
ResourceIndicator: Particulate Matter emissions

PM emissions from wildfires havedegraded air quality even before European settlement in the Methow Valley in the late 1800s. Natural and human-caused fire regularly created smoke that limited visibility and introduced pollutants into the air(USDA Forest Service 1997). Panoramic photographs taken from various peaks around the Methow Valley, Pasayten Wilderness, and Okanogan Valley in the 1920sshow landscapes obscured by haze. Records from local lookout towers over past decades describe multiple occasions when smoke from local and distant wildfires frequently settled into the airsheds around the project area for long periods of time. This anecdotal evidence supports the likelihood that wildfires have caused short-term, adverse impacts on air quality.

Smoke levels and resulting PM declined across the Columbia Basin as fire was excluded from forests, particularly after the start of organized fire suppression in the 1930s (ibid). In the past 25 years, however, PM emissions have increased as wildfires burned more frequently over larger areas for longer periods across the Western United States and Canada. The 1994 wildfires near Wenatchee, Washington, for example, produced 24-hour concentrations of PM that exceeded federal health standards by twice the limit and lasted for several days (ibid). Anecdotal evidence indicates that the 2003 Farewell Fire and 2006 Tripod Fire in the Methow Valley produced air quality problems for residents of the Okanogan and Methow valleys similar to those experienced in 1994. Wildfires in Eastern Washington during September 2012 adversely affected air quality in the interior Columbia River basin by producing smoke that created hazardous air quality conditions for more than eight days (WA DOE 2012). Routine inversions in Eastern Washington increase the impact of smoke on ambient air quality during these wildfire events. PM emissions are projected to increase as wildfire season lengthens (Westerling et al. 2006; Liu et al. 2010; Climate Central 2012; Jolly et al. 2015).

PM2.5 levels in Twisp, WA have been recorded by the Washington State Department of Ecology using anair quality monitorsince November 2006. Figure 5 displays monthly average PM2.5 readingsrecorded by this monitor from 2006-2013. Short-term spikes in PM2.5 occurred occasionally when prescribed burning was conducted (roughly April to early June and October to early November). Higher levels of PM2.5 concentrations lasted for longer periods in fall and winter months, likely caused by smoke from local wood-burning stoves during periods of stagnant air. Spikes in PM2.5 occurring during summer months correspond with heavy wildfire activity in the Methow and Okanogan Valleys and beyond, including Canada. The only reading on this chart that exceeded the NAAQS for PM2.5 happened when the 24-hour average levels of PM2.5 exceeded 35µg/m3 in late summer/fall of 2012. These emissions were caused by local wildfires in the Methow Valley area that emitted uncontrolled amounts of smoke, followed by periods of stagnant air. As wildfires were brought under control, fuels burned out, and air movement increased, levels of PM2.5 dropped off sharply. Episodes like these demonstrate that wildfires have more potential than any other air pollution source in the country for rapidly exposing the public to extremely high short-term PM2.5 fine particulate concentrations (Ottmar, personal communication, 2/10/2004).

Figure 5: Monthly Average PM2.5 Levels in Twisp from December 2006 through July 2013



Source: WA DOE 2013

Environmental Consequences

Proposed Actions Dismissed from Further Consideration

The following proposed actions will not be considered further in this analysis because they would have no measurable effect on air quality: thinning; soil restoration; opening, closing, or decommissioning roads; rock armoring; replacing undersized culverts or installing fish culverts; beaver habitat or coarse woody debris enhancement; bridge replacement; or creating hardened fords.

Alternative 1 – No Action

If proposed prescribed fire treatments did not occur, the airsheds in and around the project area would not be affected by emissions from prescribed fire treatments originating in the project area. Nearby prescribed fire treatmentswould create short-term, adverse, negligible impacts on air quality, while wildfires in and near the project areawould produce smoke that createdshort-term to long-term, adverse, negligible tomoderateimpacts on air quality depending on the amount of PM produced, current air quality, and existing ventilation conditions.Without proposed thinning and fuel reduction treatments,there would be no opportunities to reduce smoke quantity and limit the volume of smoke created by wildfires. As surface, ladder, and canopy fuel loads continue to increase over time in the project area, fires would likely burn more intensely, with more fuel consumption, longer smoldering, and higher levels of pollutants expelled into the air (Ottmar, personal communication, 02/10/2004). Increased smoke production burning during common summertime inversions would increase the likelihood of creating a longer-lasting impact on air quality and a higher chance of negatively impacting human health and visibility.

Alternative 2 (Proposed Action) and Alternative 3

Prescribed fire activities proposed in this project are identical in Alternatives 2 and 3, therefore the effectsfor both alternatives will be described together.

Project Design Features and Mitigation Measures

The design features listed in Figure 6 would help reduce fuel loading while minimizing PM impacts on human health and visibility,and would be required during prescribed fire operations. Design Features 1-6 would be reliably implemented because the burn plans required for all prescribed fire operations must follow the Interagency Prescribed Fire Planning and Implementation Procedures Guide (NWCG 2014) which requires that these concerns are addressed. Burn planners also incorporate smoke avoidance, dilution, and emission reduction strategies described in the Smoke Management Guide for Prescribed and Wildland Fire (Hardy et al. 2001). Fire management staff would maintain and regularly use an email list of known individuals with health concerns; local businesses; local and county governments; state regulatory agencies; local health clinics, schools, media, county health workers; and other interested parties. Before each burn season and before each ignition, public notifications would go to entities on this list and would be spread further by media through radio, newsprint, and internet notifications. News releases would describe the location and size of planned ignitions, contact information to reach district personnel, and the status of prescribed fire units in patrol status. Fuels staff would attempt to make personal contacts with those working and living near the area of greatest possible impact to help inform them of prescribed fire activities. Other contacts may occur as described in the current Methow Valley Ranger District Prescribed Fire Public Information Action Plan (Appendix B). District staff would respond to and track public complaints using the process outlined in the Action Plan. Smoke impacts on road visibility would be addressed using the current Methow Valley Ranger District Traffic Visibility Guide(Appendix C).

Design Feature #7 would be reliably implemented because public interest in firewood materials is strong, several units would have open road access, and debris at landing piles and in thinning units would need to wait for about one year to cure, allowing time and access for firewood gathering where consistent with the current forest firewood policy. Chipping would be reliably implemented because it is proposed where road access and slope provide for effective treatment. Biomass utilization is not reliably implemented because it depends on commercial infrastructure and economic benefits that do not

currently exist, but may be developed. The reliability and effectiveness of these design criteria are demonstrated by burn plans that comply with the Interagency Prescribed Fire Planning and Implementation Procedures Guide and the SIP, and by past monitoring conducted during prescribed fire implementation done on the Methow Valley Ranger District.

Figure 6: Design Features

Number	Design Feature	Why Necessary	Efficacy	Consequence of Not Applying
1	Coordinate burning activities through compliance with current Washington State Smoke Implementation Plan (SIP).	The SIP provides the means to coordinate ignitions, consider current and potential air quality impacts, and helps schedule burns for periods of good air ventilation, minimizing air quality impacts to local communities and Class I airsheds.	Moderate – High	Noncompliance with SIP. Public parties may be adversely effected by impacts from smoke. Addition restrictions may be placed on fuels treatments utilizing burning
2	Target burning for periods of favorable ventilation conditions of adequate length for ignition. Evaluate smoke dispersal conditions before, during and after ignition.	Gives local, site-specific evaluation of air quality conditions that may be missed during smoke approval process.	Moderate – High	Noncompliance with agency direction. Ignition may occur when local ventilation conditions are unfavorable, creating increased potential for air quality impacts.
3	Monitor smoke impacts on air quality during and after ignition.	Provides potential trigger to stop further ignitions if possible.	Moderate	Noncompliance with agency direction. Ignition may continue when air quality impacts are increasing and ventilation conditions are deteriorating, with an increased potential for air quality impacts.
4	Document air quality impacts.	If air quality problems occur, documentation helps analyze and address air quality issues.	Moderate	Noncompliance with agency direction. Objective information about air quality impacts is not available, contributing to misperceptions and uninformed decisions regarding air quality impacts.

Number	Design Feature	Why Necessary	Efficacy	Consequence of Not Applying
5	Notify public of prescribed fire activities and recommended actions to reduce impacts, using applicable contacts and methods listed in the currentdistrict Prescribed Fire Public Information Plan. Burn planners will contact residents adjacent to burn unit boundaries during planning process and include them in burn notification process as requested.	Notify public of plans for burning to provide awareness of prescribed fire activities and opportunity to minimize or avoid air quality impacts.	Moderate - High	Noncompliance with agency direction. Public has little time to prepare for potential health and visual impacts of prescribed fire smoke.
6	If smoke from prescribed burning impacts visibility on local roads, implement the current district Traffic Visibility Guide.	Reduce risks associated with reduced visibility caused smoke from prescribed burning.	Moderate to High	Noncompliance with agency direction. Increased risk to drivers using roads with limited visibility near prescribed burn units.
7	Minimize smoke emissions by allowing public firewood collection after commercial and ladder fuel reduction treatments have been completed except where biomass is proposed for use commercially. Except for landing piles, firewood collection would not be allowed where slash is hand- or machine- piled. All firewood gathering must be consistent with current forest firewood policy. Where cost-effective and feasible, chip debris from thinning activities or remove through biomass utilization or other means if consistent with effects analyzed for this project.	Reduce emissions through firewood collection, biomass utilization, chipping, and other fuels treatment methods where feasible. Provides firewood opportunities for the public.	Low – Moderate	Slight increase in emissions during prescribed burning. Public not able to gather firewood from debris piles.

Figure 7 describes the mitigation measure that would apply if ventilation conditions unexpectedly deteriorated during ignition with no potential for improvement during the burn period, or if unplanned delays occurred during ignition that would cause ignition to continue late into the day beyond the favorable ventilation window. The decision to cease ignition would be made by the burn boss in charge of the burn unit. This mitigation measure would be reliably implemented as long as firefighter safety was assured. Even if this mitigation measure were implemented, PM would continue to be produced for a short time as debris consumed. The efficacy of this measure is affected by how rapidly ignition could cease and ignited debris burns out. In pile-burn units (usually burned in moister fall conditions not

conducive to spread), ignition could stop quickly with rapid consumption of remaining debris in the piles. Ignition in underburn units, however, may take longer to stop because ignition must safely be brought to an adequate, controllable barrier before ceasing. Steep terrain and lack of roads in a burn unit may limit safe access for personnel to create control lines after ignition has begun. Any of these conditions could prolong production of PM for a short period of time after a decision to cease further ignition has been made. This analysis is predicated on applying these design features and mitigation measures.

Figure 7: Mitigation Measure

Number	Mitigation	Why	Efficacy	Consequences	Monitoring Required
1	If ignition is underway and ventilation conditions deteriorate with no potential for improvement during the burn period, or if ignition is delayed to periods with unfavorable conditions, cease ignition at the earliest and safest opportunity.	Limit PM impacts to air quality during prolonged periods of poor ventilation that occur after ignition begins with no potential for improvement.	Moderate	Potential increased and prolonged levels of PM may impact human health.	Yes. Burn boss monitors during ignition.

Environmental Consequences

Figure8: Resource Indicators and Measures for Alternatives 2and 3

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternatives 2 and 3
Air Quality	Particulate Matter	Tons of Particulate matter at 2.5 microns (PM2.5/)	2079 tons
		Tons of Particulate matter at 10 microns (PM10)	2243 tons

Resource Indicator: Particulate Matter

Figure 8 summarizes PM that would be created by proposed prescribed burning activities in Alternatives 2 and 3. Prescribed burning would cause short-term, adverse, negligible to minor impacts on air quality and human health because the PM it produces may affect air quality for sensitive individuals and the general public, as well as visibility (USEPA 2008). Prescribed fire treatments would help create long-term, beneficial, negligible to moderate impacts on air quality because by reducing fire severity in treated areas, less vegetation would be consumed and contribute to PM production during wildfires (Schaaf,

1996). Recent thinning and prescribed fire treatments elsewhere on the district helped limit air quality impacts caused by wildfires because they reduced fuel loading and created safer direct suppression opportunities, thereby reducing fire intensity, fire growth, and related PM emissions in some areas of the Tripod, Leecher Mtn, Carlton Complex, Little Bridge Creek, and Twisp River wildfires. (Trebon 2006, Trebon & Johnson 2014).Given the frequent occurrence of ignition through lightning alone, the environmental conditions that annually support wildfire spread, and the availability of fuels to burn, future wildfires in and around the project area are certain. Wildfires generally produce two to four times more smoke per acre than prescribed fires because of drier weather and higher fuel consumption during the less-efficient smoldering stage, with no way to control where the smoke goes or when it will occur. Smoldering that occurs during wildfires produces about twice as much PM10 and PM2.5 when compared to a prescribed fire (NWCG 2001; Ottmar, personal communication, 02/10/2004).

While smoke from neither prescribed fire nor wildfire is good for humans, prescribed fires proposed in this project would provide opportunities to reduce the volume of PM produced and control the direction and timing of smoke flow. Prescribed fire prescriptions would require conditions when fuels would be consumed more efficiently and produce less smoke. In applying prescribed fire, the dry forest landscape in the project area would act more like its historical fire-adapted ecosystem. The potential release of emissions during any wildland fire in the project area would be substantially reduced following implementation of the prescribed fire treatments described in the proposed action. Mechanical and prescribed fire fuels treatments would reduce fuels and reduce the likelihood of high-severity fires in treatment areas, allowing for opportunities to control fires at smaller size and minimizing long-term air quality impacts. PM10 production from wildfires would be reduced considerably where prescribed fire treatments are applied. Prescribed fires would beplanned for periods when smoke would disperse quickly and avoid sensitive airsheds, further reducing their impacts on air quality in comparison to wildfires that create unpredictable volumes of PM during periods of stagnant air movement.

The design criterion above would help limit human health and visibility impacts from PMand help ensure that PM production does not exceed NAAQS. These criterion would provide for public notification of potential impacts and actions to take to limit exposure. PM production during any single ignition would be restricted by the acres burned, which depends on fuel and ventilation conditions inherentnumber of personnel available and funding. Local experience shows that ground crews can generally ignite up to 150 acres per day by hand, while aerial ignition accomplishes about 200 to 650 acres per day. Average yearly funding for prescribed fire activities generally allows for up to 1500 acres per year of underburning and 800 acres of pile burning, which is generally spread over multiple areas on the district. PM emissions created by this project would be dispersed over several days during each spring and fall burn season (generally April – early June and mid-September – early November) over about 15 years, with time allowed for smoke dispersal between completion of one underburn project and initiation of the next one.

Smoke drifting towards populated areas with no indications of atmospheric mixing would trigger the mitigation measure described above such as terminating or reducing ignition in that area until atmospheric mixing improved. These measures have been used successfully on the Methow Valley

Ranger District over the past fifteen or more years of prescribed burning and are moderately to highly effective in reducing potential impacts to air quality.

Figure 9 displays the amounts of PM2.5 and PM10 that would be created by each type of prescribed fire treatment. Modeling over-predicts emissions for underburns because it assumes a uniform fuel loading across the entire unit and that units are fully blackened; however, fuel loading varies across units and underburning usually creates a mosaic of about 75% burned and 25% unburned areas on average within the unit boundary.In 7,283 acres of underburn treatment units outside of Variable Retention Thinning units, the initial prescribed fire treatment would be followed up in approximately 10-12 years with a maintenance underburn that would create less PM than the initial prescribed fire treatment because the fuel loading during this treatment would be less than during the original treatment.

Figure 9: Particulate Matter Emissions by Proposed Prescribed Burning by Treatment Type

Treatment	Amount Proposed	Tons PM2.5 per Acre or Landing	Total Tons PM2.5	Tons PM10 per Acre or Landing	Total Tons PM10
Underburn (Initial treatment)	7363 acres	0.22	1620	0.24	1767
Underburn (Maintenance treatment)	7283 acres	.05	364	.05	364
Burn hand piles	2848 acres	0.01	29	0.01	29
Burn machine piles	757 acres	0.02	15	0.03	23
Burn landing piles	187 landings	0.27	51	0.32	60
		Totals:	2079 tons		2243 tons

Effects on Class I Airsheds

Prescribed burning may have short-term, negligible, adverse impacts on the nearest Class I airsheds (the Pasayten or Glacier Peak Wildernesses or North Cascades National Park), but these impacts would be limited because of the distance between these areas and proposed burn units in this project. Ignitions would be planned for times when upper-atmospheric ventilation conditions would be able to dissipate and mix smoke created by prescribed burning in this project. Impacts to Class I airsheds would further be limited by regulations in the SIP.

Cumulative Effects

Spatial and Temporal Context for Effects Analysis

The spatial boundary for cumulative effects on air quality is defined bythe airsheds listed in Figure 3 because these are the areas where PM produced by prescribed burning proposed in this project is most

likely to affect air quality and visibility. The temporal boundary for cumulative effects on air quality is three days, the amount of time it takes for the majority of smoke from a prescribed burn activity to fully dissipate during and after ignition on the first day, with potential overnight settling the one to two nights after ignition.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

There are no adverse impacts from past or current prescribed burning activitiesor burning done by the general public (woodstoves and debris piles)within the Methow Valley drainage at the time of this analysis. Planned prescribed fire activities that will affect air quality in the airsheds listed in Figure 3 include prescribed burning planned on National Forest lands north and west of Winthrop, WA and east of Twisp, WA; and on nearby state and federal lands managed by other entities, along with burning conducted by the general public (woodstoves and debris pile burning). The exact amount of PM created by these activities and the cumulative impact of PM is unknown because the timing and extent ofprescribed burning conducted by allland management entities and the general public is unknown, but the cumulative impact of these activities is generally short-term, adverse, negligible to minor effects. Any smoke drifting or settling in the Methow Valley area from prescribed burning activities would dissipate completely within one to three days with no lingering evidence, although ongoing smoke production from woodstove use may continue to produce PM.

Figure10: Resource Indicators and Measures for Cumulative Effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternatives 2 and 3	Past, Present, and Future Actions (Units)	Cumulative Impacts (Units)
Air Quality	Particulate Matter	Tons of Particulate matter at 2.5 microns (PM2.5/)	2079 tons	Unknown	Unknown
		Tons of Particulate matter at 10 microns (PM10)	2243 tons	Unknown	Unknown

Resource Indicator: Particulate Matter

Figure11: Particulate MatterCumulative Effects

Project	Overlap In		Measurable Cumulative Effect?	Extent, Detectable?
	Time	Space		
Planned Forest Service Prescribed Fire Activities.	Yes	No	No	There may be an overlap in timing of these projects with The Mission Restoration Project; the cumulative PM would be negligible due to implementation of design criteria and mitigation measures, conformance with existing standards and guidelines on both the existing projects and the Mission Restoration project.

PM from burning conducted by other land management agencies and the general public sources.	Yes	Yes	Variable	The general public may create PM at the same time and place as prescribed fire activities proposed in this project, and the extent may affect the airsheds listed in Figure 3. PM created by the general public may be readily detectable and localized, and usually disperses later in the day as temperatures warm. Adverse PM concentrations, when combined with unfavorable ventilation conditions, would cause Forest Service personnel to delay further ignitions until conditions improved. The cumulative impact of PM would be negligible due to implementation of design criteria and mitigation measures and conformance with existing standards and guidelines on proposed prescribed fire activities.

Conclusion

The cumulative effect of past, present, and reasonably foreseeable future actions and the prescribed burning proposed in Alternatives 2 and 3on air quality would include short-term, adverse, negligible to minorimpacts because it produces PM that may affect human health and visibility. Cumulative effects also include long-term, beneficial, negligible to moderate impacts brought because treatments reduced wildfire severity and/or acres burned, thereby limiting PM production.

Other Relevant Mandatory Disclosures

Compliance with LRMP and Other Relevant Laws, Regulations, Policies and Plans

Okanogan National Forest Land and Resource Management Plan

Implementing the proposed action would be consistent with the goals, objectives, and standards and guidelines of the Forest Plan as follows:

Forest-wide Standard & Guideline 14-1: Management activities within the Forest shall be planned to maintain air quality at a level adequate for the protection and use of the National Forest resources, and which also meet or exceed the applicable Federal and State standards. Following the state SIP and monitoring air quality before, during, and after ignitions would help meet this standard.

Forest-wide Standard & Guideline 14-2: The Forest shall demonstrate reasonable progress in reducing total suspended particulate (TSP) emissions from prescribed burning by using efficient means of slash disposal (such as hand-piling or machine-piling) wherever feasible. Mastication would occur over approximately 700 acres in one large unit area to break up slash particles created by ladder fuel reduction treatments, eliminating emissions from prescribed burning in this area. Implementing Alternatives 2 or 3 would be consistent with the goals and objectives, and standards and guidelines of the Forest Plan and Forest Service manual direction applicable to air quality. Prescribed fire treatments would be designed and implemented in a cost-effective manner to comply with the Clean Air Act and the Washington State Smoke Implementation Plan.

Forest Service Manual Direction

Implementing the proposed action would be consistent with Forest Service Manual direction because this analysis integrates air resource management objectives into planning and management activities proposed by the Mission Restoration Project. Prescribed fire projects would be implemented in the most cost-effective manner that provides for the safety of personnel and the public while meeting resource objectives.

Federal Law: the Clean Air Act (CAA)

Prescribed fire activities proposed by this project would comply with the requirements of the CAA by limiting emissions to periods when fuels are dry enough to consume efficiently with limited smoldering when sufficient air movement will loft and disperse particulate matter, minimizing impacts to human health and welfare. Class I airsheds near the project area are not likely to be affected by proposed treatments. No nonattainment areas would be impacted by proposed treatments.

State and Local Law: Washington State Smoke Implementation Plan (SIP)

Burn implementation would comply with the SIP to avoid, dilute, and reduce potential smoke impacts to local communities, forest workers, forest visitors, and nearby residents. To avoid smoke production, prescribed fire treatments in harvest units would occur to the extent needed to reduce fuel hazards and to prepare sites for reforestation. Fuels planners would evaluate fuel loading and burn unit design before implementing underburns. Where post-treatment fuel loads are acceptable throughout the entire treatment unit, prescribed fire treatments would be avoided unless that thinning unit was part of a larger proposed landscape underburn.

Smoke produced by prescribed burning would be reduced to the extent that firewood collection occurred. Fuels treatments would be delayed one year to allow firewood collection where accessible and consistent with the current firewood policy. Firewood collection would not be allowed where fuels were piled because this practice would break apart the piles, reducing the effectiveness of pile burning operations in reducing treatment residues and adding considerable expense to treating fuels.

Watershed Analyses

This project would be consistent with recommendations made in the Twisp River Watershed Analysis because it recommends methods to reduce air quality impacts, including scheduling prescribed burning in such a way to reduce smoke impacts to adjacent landowners and forest visitors. Monitoring during implementation includes assessing visibility to determine how management activities negatively impact air quality, and continue monitoring air quality with the air quality monitor located in Twisp, WA.

Required Monitoring

Air quality monitoring is required by the SIP and the Prescribed Fire Planning and Interagency Implementation Procedures Guide (NSCG 2014) before and during implementation to assess current air quality, during ignition to assess effectiveness of ventilation and movement, and after prescribed burning during the patrol phase to assess ongoing air quality impacts. Monitoring may include recording PM at established monitors in Twisp and Winthrop; assessingstrength and quality of ventilation during

ignition; and evaluating visibility on roads. No additional air quality monitoring would be required as part of this proposed action.

Summary

The following section addresses the Intensity Factors for Determining Significance (FSH 1909.15_10).

1. *Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.*

   Taking no action would result in short-term, adverse, negligible impacts on air quality from burning conducted by land management agencies outside of the project area, and burning conducted by the general public in and around the project area, with no effect on limiting air quality impacts from expected wildfires in and near the project area. Implementing Alternatives 2 and 3 would cause short-term, adverse, negligible to minor impacts because prescribed burning would produce PM that may affect human health and visibility. Cumulative effects also include long-term, beneficial, negligible to moderate impacts caused by treatments reducing wildfire severity and/or acres burned, thereby limiting PM. The connection between air quality impacts that would be caused by this project and the Intensity Factors for Determining Significance are explained below.

2. *The degree to which the proposed action affects public health or safety.*

   Prescribed burning proposed in this project will produce PM that may adversely affect human health and visibility as described above. The intensity and duration of these impacts would be minimized by use of design criteria. PM production would cease when ignition was completed and debris had completed consumption in each proposed burn unit.

3. *Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.*

   Proposed prescribed fire activities may cause short-term, adverse, negligible impacts on Class I airsheds. These impacts would be limited by SIP regulations and would cease after main ignition was completed and smoke dispersal occurred.

4. *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*

   The effects of prescribed burning on the quality of the human environment may cause controversy among people whose health or visibility is affected by PM. The degree of controversy that may occur is unknown.

5. *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*

Models predicting PM production are well-developed and peer-reviewed. The effects of PM on human health are well-researched and predictable. The potential for PM from prescribed burning proposed in this project is moderately to highly predictable.

6. *The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.*

   The prescribed fire actions proposed in this project would not set a precedent for future actions with significant effects, or represent a decision in principle about a future consideration.

7. *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*

   Prescribed fire activities proposed in this project would not contribute to cumulatively significant impacts on the environment.

8. *The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.*

   Prescribed fire activities would not affect districts, sites, highways, structures, or objects listed in or eligible for listing in the NRHP, or cause loss or destruction of significant scientific, cultural, or historical resources.

9. *The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.*

   Prescribed fire activities would not adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the ESA.

10. *Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment. (40 CFR 1508.27)*

    Prescribed fire activities would meet the Clean Air Act and would not violate Federal, State, or local laws or requirements imposed for the protection of the environment.

Degree to Which the Alternatives Address the Issues

Figure12:Summary comparison of how the alternatives address the key issues

Issue	Indicator/Measure	Alt 1	Alt 2	Alt 3
Prescribed burning will negatively affect air quality.	Tons of Particulate matter at 2.5 microns (PM2.5/)	0 tons	2079 tons	2079 tons

Issue	Indicator/Measure	Alt 1	Alt 2	Alt 3
	Tons of Particulate matter at 10 microns (PM10)	0 tons	2243 tons	2243 tons

Appendix A: Literature

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Appendix B: Methow Valley Ranger District Prescribed Fire Public Information Action Plan

MVRD RX Fire Public Information Action Plan

Last revised 2/23/2016

Goals:

- *Inform and, when possible, educate people about prescribed fire use and impacts.*
- *Provide channels to receive and respond to public comments and concerns*

Guidelines:

- *Be proactive at informing the public about smoke impacts.*
- *Keep information contacts as current and broad as necessary.*
- *Keep inviting public involvement.*
- *Use the items listed below as necessary or useful; some items may be done rarely.*

Note: "RX Fire Info Contact" may be Fire Manager, Prescribed Fire Manager, AFMO-Fuels, fuels tech, public affairs staff, district front desk staff, or an IIO/PAO.

1. **Public involvement & input during the NEPA analysis for all proposed burn projects**
   - **Purpose/ Message:** Inform the public of the location, purpose, and timing of proposed projects. Seek public concerns and issues about proposed projects for ideas that will help in the design of site specific projects.
   - **Scope:** MethowValley residents and other interested citizens and agencies. Especially those who have expressed interest and those most likely to be affected by the project.
   - **Timing:** Throughout the NEPA cycle as potential projects are scoped and analyzed.
   - **Who:** Interdisciplinary Team Leader with input from fuels analyst

2. **Burn Plan Brochure**
   - **Purpose/Message:** Education and information on planned burn activities each year.
   - **Scope:** Sent to Methow Valley residents in the mail; also to Tonasket RD and OVO for distribution, plus HQ, RO, DOE, DNR. Brochures are available at front desk and to fall hunter information tent.
   - **Timing:** Mailed by April 15th each year
   - **Who:**AFMO Fuels or designee

3. **Home, Business, Campground, and Trailhead Notifications**
   - **Purpose/Message:**Unit-specific notification needs will be identified in the burn plan by the planner. As indicated, notify residents and businesses of upcoming planned prescribed burn activities in their immediate area with contact information for more details. Post affected campgrounds and trailheads with information 2-3 days before burning, and follow up with a site visit on the day of burning to check in with campers.

If resident or business isn'tavailable, leave notice (doorknob hanger, note, or sign) in obvious location.

- **Scope:** Residents, businesses,or forest users who might be directly impacted by smoke.
- **Timing:**Up to a week before burn. Especially important to post dispersed camps that may be within burn unit, or might be intensely affected by smoke.
- **Who:**Burn Planner (identify needs), Burn Boss or designee (make notifications)

4. Pre-Burn Season News Releases

- **Purpose/Message:**Inform public, agencies, and others with interest in planned burn activities before each burn season. Elaborate on information in Burn Brochure. Post-season news release can list accomplishments, successes, number of smoke-free days, etc. Remind people of other information sources (phone line, daily emails, website, Twitter, etc).
- **Scope:**Line officer, district employees, internal public affairs staff, DOE Yakima & Olympia, WA DNR, Methow Valley News, Wenatchee World, KOZI Radio (Chelan), KVLR Radio (Methow Valley), and Rx Fire emailpublic distribution list. Public affairs staff (i.e. Shannon) may postnews releases on forest web at http://www.fs.usda.gov/detail/okawen/landmanagement/resourcemanagement/?cid=stelprdb5307935 (as of 11/20/2014)
- **Timing:** One article beforespring and fall burn seasons; another article at the end of each burn season.
- **Who:**AFMO Fuels or designee

5. Pre-burn Phone Calls

- **Purpose/Message:**Notify project-specific interested parties of planned prescribed burn activities in their immediate area. Includes calls to county sheriff, NE DNR, district fire chiefs, and people on general and area-specific notification list maintained by the AFMO-Fuels and filed at O:\NFS\OkanoganWenatchee\Staff\MET\OkanoganDiv\fuels\PFM . See file MVRD RXFire Ops (season) (year).xlsx , under the tab "Contact Numbers" for updated contact list. Document contacts in burn plan file.
- **Scope:** Per burn plan and NEPA analysis for each unit.
- **Timing:**Two to three days before planned burn implementation, then on the day of the burn as determined by the contacted person or line officer. Consider making post-burn calls to people with health concerns who may have been affected by smoke to gauge effects of smoke, actions taken by individual, etc. This information can be used to inform decisions on future burning in that area during the same season or in the future.
- **Who:**Fuels Analyst/Burn planner/AFMO Fuels update call list; Burn Boss or designeemakes calls

6. Daily/Weekly Emails and/or Faxes

- **Purpose/Message:**BRIEFLY inform interested partiesabout planned and ongoing burn & patrol activities as needed through the week during burn seasons. Possible information may include list planned burn units, location and duration/area of expected smoke impacts; hazards; status of units already burned; any closures, etc. Include any relevant

information on planned, current, or lingering smoke impacts, and actions we're taking to minimize them. Invite public to visit a burn-in-progress. Can include photos from recent burns. If a smoke impact occurred from burn, describe why we think it happened and what actions were taken to minimize it, and when we think the impact should dissipate. Can inform about planned burns that were approved at the state level but not started because of our air quality concern.

- **Scope:**Same as #5 above.
- **Timing:** Beginning and end of each week and during week as needed depending on amount of activity and impacts.
- **Who:**AFMO Fuels or designee. Email list is in Outlook for anyone's access; use "FS-PDL R6 Oka Wen MVRD RxFire Public Contacts". Put the email address on the "bcc" line so that individual addresses are not visible to other recipients.

7. Complaint Tracking

- **Purpose/Message:**Respond to questions and concerns during prescribed burn seasons within 12 hours or less. Ultimate responsibility for returning calls belongs to the Fire Manager or Prescribed Fire Manager (typically the AFMO-Fuels); this responsibility could be delegated to the FMO. Only in rare cases would we delegate it to a burn boss. Current process:
  - Unless specifically allowed by the employee, no employee cell phone or personal phone numbers are given to callers. Burn bosses actively directing a burn should not be contacted to respond to calls. No caller information should be given over the radio unless urgent.
  - During the burn seasons, the Fire Manager or Prescribed Fire Manager (FM/PFM) decides whether a Public Affairs staff (Shannon, Tommy, or designee) is needed to be on call to perform the duties described below. Need for public affairs staff can be based on anticipated impacts, lingering impacts, or the need for additional coverage.
  - Calls to front desk are forwarded to FM/PFM if they are in the office. This person talks to the caller, responds appropriately, and logs the call. Issues raised by the caller are elevated to FMO, Ranger, or forest Staff as needed.
  - If the FM/PFM is out of the office, the front desk staff asks the caller if they would like to leave a message on the district's prescribed fire phone line (509-996-4040) or if they would like a their call returned within 2 hours.
    a. If the caller wants a return call within 2 hours, the district front desk staff notifies the Public Affairs staff (as designated above) with the caller's contact information. This person talks to the caller, responds appropriately, and logs the call. Issues raised by the caller are elevated to FMO, Ranger, or forest Staff as needed.
    If no Public Affairs staff is on call, the front desk staff leaves a message with caller's contact info and concerns on the FM/PFM's phone line. If the front desk staff decides the call is urgent, they can contact the FM/PFM over the radio and request a cell call to relay information, or request help from the FMO or Ranger.

b. If the caller wants to leave a message on the prescribed fire phone line, the front desk staff forwards them to this number.

- When a Public Affairs staff is on call, at mid-afternoon during burn season they retrieve messages from the prescribed fire phone line. If the caller leaves a name and number, the public affairs staff talks to the caller, responds appropriately, and logs the call. If no callback is requested, the public affairs staff logs the comments, date, and time. Issues raised by the caller are elevated to FMO, Ranger, or forest Staff as needed.
- To make sure all calls are accounted for, the FM/PFM is responsible for checking the prescribed fire phone line for any messages. This duty can be delegated, but the FM/PFM is responsible for returning calls as soon as possible. All public or interagency contacts related to smoke or other hazards will be logged.

- **Scope:**Anyone with a complaint about the district's prescribed fire activities.
- **Timing:** As needed during burn seasons.
- **Who:** As described above.

8. Forest Prescribed Burn Web Information Page, Twitter

- **Purpose/Message:**Same as #5, #6
- **Scope:**Anyone looking for info on prescribed burn information, fire ecology, air quality, health impacts, etc. Consider asking local community bulletin electronic boards and community media web pages and other partners to link to the site. Website: http://www.fs.usda.gov/detail/okawen/landmanagement/resourcemanagement/?cid=stelprdb5307935 (as 2/2016)
- **Timing:**Ongoing
- **Who:**AFMO Fuels or designee provides information for website to Shannon O'Brien or delegate through the email list described in #6 above; one of these staff can post pre-season and daily email updates to web.

9. Burn Information Phone Line

- **Purpose/Message:**Inform callers about ongoing or planned burn activities each day/week. Uses information from the Burn Brochure, including drainages affected, number of days of impacts, and reference to front desk phone number for questions.
  To Record New Message:

  Dial 996-4040 from anywhere. When outgoing message starts, press the star key.
  Enter ID: 9964040
  Enter Password: see password posted on phone
  To Change Outgoing Message, Enter 4, Enter 1, Enter 1, Enter 1, Enter 1
  Record your message. Here's a suggested format:
  Hello, you've reached the Methow Valley Ranger District's Burn Information Line.

  Today is(day, date).

  Yesterday:

- List ignition accomplishments by unit or area; always give nearest town and direction/distance of unit from this town, and corresponding burn brochure number.
- Describe any smoke impacts seen or actions taken to reduce smoke impact. If smoke is expected to linger anywhere today, describe why and when it's expected to dissipate.

Today:

- List units in patrol status.
- List new ignitions; describe the closest town and direction from this town, and corresponding burn brochure number.

Over the next week, if weather and smoke ventilation conditions allow, we plan to start ignitions at(list units and general locations. Add other relevant information such as specific hazards for folks to watch out for, road closures, district no-burn decisions, etc.)

After the tone you can leave us a message, or call 996-4000 to speak to the front desk staff during regular business hours. If you'd like us to call you back, please include your name and phone number. You can also leave us your email address if you'd like to receive daily burn updates by email. Thank you for your interest in our program.

- **Scope:** Available to anyone who calls this number (509-996-4040), listed in each burn news release, the burn brochure, and on the web.
- **Timing:** During burn season, change message at least at the beginning of every week and on Friday to describe any weekend activities. If more burn activities or impacts occur during any week, change message more frequently. At end of each burn season, leave a message summarizing accomplishments and district contacts.
- **Who:**AFMO-Fuels or Rx Fire Info Contact

10. Radio Interviews

- **Purpose/Message:**Inform & educate about planned burn activities. Discuss information from the Burn Brochure, accomplishments, impacts, reasons for timing, other points of interest; inform folks on how to get more information through phone line/website; invite public visits to burns.
- **Scope:** On KOZI and KVLR, these will reach anyone in the Methow listening.
- **Timing:** As requested or desired.
- **Who:** Ranger, FMO, AFMO-Fuels, Public Affairs staff, IIO.

11. Prescribed Fire Display

- **Purpose/Message:** Education and information on what is planned each burn season, or each week. Benefits and impacts of prescribed fire, and what we do to minimize impacts. Elements of a burn plan. Opportunity for public involvement. District contacts.
- **Scope:**Depends on location. As of 12/2016, district has no space for a permanent installation and no temporary display exists. Could have one set up for Farmer's Market

use during burn season; would provide a catalyst for public discussion about fuels treatments in general and rx fire in particular.
- **Timing:** Depends on use
- **Who:**Coordinate with AFMO-Fuels

12. Success Storiesthrough National Fire Plan or local media
- **Purpose/Message:** Upward education and information on accomplishments in natural fuels implementation, especially in urban interface areas. Ongoing projects, partnerships, planned projects. Pictures and articles on completed projects with district contacts. Focus on 1-2 projects per year (rural community development, partnerships, etc). Currently not sure how to submit success stories through forest, region, or the website below.
- **Scope:**National Fire plan: http://www.forestsandrangelands.gov/success/index.cfm Local media: through news releases.
- **Timing:** As possible. Especially effective as soon as possible after a successful burn treatment, or after a wildfire went through an area treated with thinning and/or rx fire with resilience to wildfire effects. Also effective after a fuels treatment is used as direct or indirect fireline.
- **Who:**AFMO Fuels or designee, public affairs staff

13. Washington State Hunter Pamphlet
- **Purpose/Message:**Potential for impacts to hunters from prescribed fire during fall hunting season with phone number to contact Wenatchee HQ for more information, and our website address.
- **Scope:** Reaches all hunters receiving a hunting license. Refers anyone hunting on the Okanogan and Wenatchee NFs to HQ.
- **Timing:** As of 2012, WA DFW includes a large notification in the yearly state hunting pamphlet directing hunters to be aware of prescribed burns and providing forest-level contact information.
- **Who:**AFMO Fuels or designee, public affairs staff

14. Washington Hunting News/Cascade Lookout Article
- **Purpose/Message:** Article on Rx fire and hunting: benefits and impacts to animals and people, reason for timing, planning process, district fuels contacts, success stories.
- **Scope:** Available through website (www.fishhunt.dfw.wa.gov) and by hardcopy to hunters. Hunting News is published in the fall each year; Cascade Lookout (Oka-Wen forest newspaper) deadline is January.
- **Timing:** Submit articles for Washington Hunting News to Jerry Nelson (editor, WA Dept of Fish and Wildlife, 1-360-902-2515; nelsojpn@dfw.wa.gov) by mid-July. Work with John Rohrer to include accurate info on wildlife impacts/benefits. Try to find pix of deer/wildlife in a burn area.
- **Who:**AFMO Fuels or designee or public affairs staff, working with district wildlife biologist.

15. Hunter Information Tent/Booth

- **Purpose/Message:**Educate and inform the public on planned Rx burns during fall hunting season. Benefits and impacts of prescribed fire, and what we do to minimize impacts. Burn planning process, and how to become involved. District fuels contacts. Fire prevention info (Smokey Bear stuff). Other shops may want to display info too, and hopefully help out with staffing (Respect the River, etc).
- **Scope:** Various; may include locations at parking lot next to Winthrop Barn and staffed in partnership with WA Fish and Wildlife. Attracts many hunters traveling through the Methow. Could also consider display at Twisp Farmer's Market, mini-marts, grocery stores.
- **Timing:** Each fall before start of general hunting season. Most effective staffing is Thursday – Saturday.
- **Who:**Fire/Fuels staff and other district staff as a joint effort (recreation, fire, fisheries, wildlife, state DNR or DFW person, etc). Fire folks can assist with setup, staffing, and removal of tent.

16. County Community Wildfire Fire Planning Group

- **Purpose/Message:** Discuss planned district fuels management projects with the county Community Fire Plan Coordinating Group and seek feedback on priorities and approaches.
- **Scope:**County-level planning staff associated with the CWPP.
- **Timing:**January at Okanogan County Community Wildfire Protection Plan/Local Coordination meeting.
- **Who:** FMO or AFMO-Fuels.

17. Public Information Meetings

- **Purpose/Message:**Respond to current questions and concerns. Inform & educateabout fuels projects and impacts. Options could include elements of prescribed burn plan, smoke approval process, how we try to mitigate smoke impacts, etc. Might include prescribed fire successes, fuel reduction methods, implications of not treating fuels. Always provide district fuels contacts and other ways to get more information.
- **Scope:** Residents, visitors, and property owners in the Methow Valley.
- **Timing:** As needed.
- **Who:**Ranger, Forest and District Staff, regulatory agency representatives, AFMO-Fuels, others as needed.

18. Contingency Communication Plan for Smoke Events

- **Purpose/Message:**For significant local smoke events caused by rx fire, as determined by Ranger, FMO, or forest staff. Respond to questions, concerns; hold public meetings as needed. Keep documentation on contacts, actions, decisions.
- **Scope:** Valley residents/businesses/visitors impacted by smoke.
- **Timing:** As needed.
- **Who:** District fuels staff, Ranger, public affairs staff, and forest and/or regional office air quality/rx fire staff. Cooperating agencies.

Appendix C: Methow Valley Ranger District Fire Activity Traffic Safety Guide

Methow Valley Ranger District
Fire Activity Traffic Safety Guide

Background:
The purpose of this guide is to identify safety measures to assist motorists when visibility is reduced by particulate matter emitted from fire activity. These measures were developed in accordance with State and Federal regulations as well as Okanogan-Wenatchee National Forest engineers. The recommendations within this document are provided to assist Fire Managers in providing for safety along forest, county, and state roads.

Description of visibility hazards:
Two sources of health and visibility hazards produced by wood smoke are considered by this guide: water vapor and particulate matter. Researchers analyzing the chemistry of smoke from prescribed fires found that more than 90% of the mass emitted is in carbon dioxide and water vapor (USDA Forest Service 1976). Water vapor is important because it can affect visibility near a fire. At night, if a cooled air mass is already near saturation near the ground (relative humidity = 100%), water vapor injected from smoldering fuels can cause the air mass to become super-saturated, that is, the relative humidity will briefly exceed 100%. If sufficient hygroscopic nuclei (particles on which water can condense) are present, the super-saturated air mass can flash into a super-dense fog, severely limiting visibility. Particulate matter (PM) is defined as any dispersed aggregate matter, solid or liquid (other than water), between 0.0002 and 500 micrometers (urn) in diameter. PM makes up approximately 1 to 3 percent of the total mass released in wood smoke (USDA Forest Service 1976). Particles greater than 10 to 20 urn in diameter will fall out of the atmosphere within 0.5 to 1 mile from the source of production, especially during near-calm wind conditions.

Smoke emissions from prescribed burns can release large amounts of PM. About 90% are 10 urn (PM-10) or less, and 70 percent are 2.5urn (PM-2.5) or less. These are the particles that scatter headlight beams from automobiles and create health hazards for people when inhaled.

Visibility hazards should be identified and mitigated using the measures described in Table 1 to determine the level of visibility impacts and the recommended mitigations measures. Four levels of visibility impacts have been identified ranging from nuisance impacts to significant sight distance impacts. Mitigation measures described in Table 1 below include public notification of fire activity, signing along roadways, and using contractors to provide traffic control. Table 2 describes the requirements for roadway sign materials and construction.

Table 1: Visibility Impact Levels

Impact Level	Smoke Conditions	Safety Strategy
1	• Light to moderate impact on roadway • Excellent to good smoke ventilation • Visibility greater than 0.5 mi (about 2600') • Traffic flow is generally unaffected	• Use "Fire Activity Ahead" or "Prescribed Burning" signs 1/10th mile before visibility impact
2	• Moderate impact on roadway • Good to moderate smoke ventilation • Visibility less than 0.2 mi (about 1100') • Traffic flow is slowed but not impeded	• Use "Low Visibility Smoke" signs ½ mile prior to all approaches of visibility impact • Use "Fire Activity Ahead" or "Prescribed Fire" signs 1/10th mile before visibility impact
3	• Moderate to heavy impact on roadway • Moderate to poor ventilation of smoke • Visibility less than 0.1 mile (about 600') • Traffic flow is slowed and may require the use of flaggers to restrict traffic flow	• Use certified traffic control contractors until impact level subsides • Use "Low Visibility Smoke" signs ½ mile prior to all approaches of visibility impact • Use "Fire Activity Ahead" or "Prescribed Fire" signs 1/10th mile before visibility impact • Notify WADOT or county road department if state or county roads are impacted
4	• Heavy impact on roadway • Moderate to poor smoke ventilation • Visibility less than 0.1 mile (about 600') • Traffic is unable to navigate roadway without assistance of pilot car	• Use certified traffic control contractors and pilot cars until impact level subsides • Use illuminated sign boards to display traffic warnings • Notify WADOT or county road department if state or county roads are impacted

**These visibility impact levels were designed using the Federal Highway Administration Best Practices for Low Visibility case studies, and the Washington State DOT Speed Management Control Strategies for low visibility conditions including rain, fog, dust, smoke, and snow.*

Table 2: Roadway Sign Requirements:

Roadway	Minimum Size & Type	Additional Requirements
USFS	• 30" X 30" • Reflective Orange or Yellow Diamond	None
Okanogan County	• 30" X 30" • Reflective Orange or Yellow Diamond	None
State Route	• 48" X48" • Reflective orange or pink diamond • Mesh Roll-Up with stand and crossbars	Coordination with WA-DOT concerning smoke impact on State Routes
State Highway	• Electronic Reader Boards • Pilot Cars if needed	Coordination with WA-DOT transportation management group & service contract

Notification Plan:
For all levels of impact, the burn boss should evaluate smoke behavior (smoke direction, rise, and geographic areas of potential impact) and document visibility impacts and actions taken.

Level 1- Burn boss should continue to evaluate smoke impacts and use observers to identify potential off-site areas where visibility is impacted or smoke settles.

Level 2- Burn boss should notify Fire Manager (FM) of reduced visibility conditions and initiate the recommended safety measure. Note the impacted roadway name/numbers and locations. Evaluate, discuss, and document impact duration and potential for increase in impact level with the FM.

Level 3- Burn boss should notify FM of impaired visibility with the need for traffic control. Note the impacted roadway name/number and locations. FM should inform Okanogan County Sheriff and WA-DOT of visibility impacts and order contract traffic control resources, specifying the required signs and flaggers to assist traffic until visibility impact subsides. FM should notify CWICC, District Fire Management Officer (FMO), District Ranger, and Forest Fire Staff of visibility impact level requiring traffic control assistance.

Level 4-FM should inform Okanogan County Sheriff and WA-DOT of potentially hazardous visibility impacts. FM in conjunction with District Ranger, Okanogan County Sheriff, and WA-DOT should determine the need for use of pilot cars and/or temporary closure of impacted roadways. When ordering contract traffic control resources, specify the required signs, flaggers, pilot cars, and additional needs to assist traffic until visibility impact subsides. FM should notify CWICC, District FMO, District Ranger, and Forest Fire Staff of visibility impact level requiring traffic control assistance and/or road closure.

Area Traffic Control Contractors:

ARLO Industries Inc
1020 Port Drive, Clarkston, WA 99403
(509) 751-8841

Changing Directions
14365 State Route 97, Entiat, WA 98822
(509) 784-8708

Metro Traffic Control
1522 North Washington Street Suite 209, Spokane, WA 99201
(509) 326-3979